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RATES OF ADVANCE IN INFANTRY DIVISION
ATTACKS IN THE NORMANDY-NORTHERN
FRANCE AND SIEGFRIED LINE CAMPAIGNS

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13. ABSTRACT <p>Historical research is aimed at gaining insights into any relationships which might exist among the key simulation elements of force ratios, casualties, and rates of advance.</p> <p>A representative sample of 90 allied infantry division attacks was prepared in order to illustrate the character of advances achieved and casualties incurred. Fifty of the actions occurred in Normandy-Northern France and thirty-five in the American attack on the Siegfried Line. Five battles from the Ardennes campaign are also included because of the similarity of the terrain to that of the Siegfried Line.</p> <p>The purpose of the paper is not to attempt to establish precise relationships among the factors of rates of advance, casualties, resistance and terrain, but rather to determine general relationships of value to the model builder.</p>			

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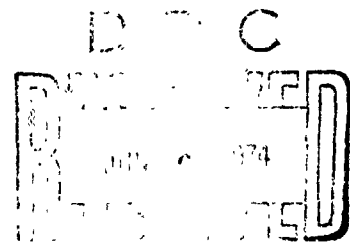
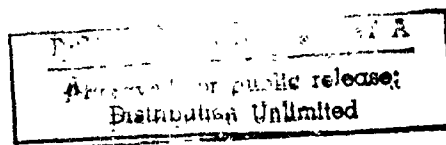
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PREFACE

The research presented in this paper is in the area of historical combat statistics for possible use as input to simulation models.

Historical research was focused on two areas: casualties and advances. The former subject is covered in a separate paper (P-989). The present paper deals with advances in two campaigns: Normandy-Northern France and the Siegfried Line.

The purpose of this paper is not to attempt to establish precise relationships among the factors of rate of advance, casualties, resistance, and terrain. There is usually insufficient numerical data for that even on a one-sided basis. Rather, it is hoped that some general relationships--some proportions--will emerge that will be of use to model-builders.

Data are presented for attacks in which an advance was gained. Then a rough estimate is made of the percent of all attacks in which an advance was registered.

RATES OF ADVANCE IN INFANTRY DIVISION ATTACKS IN THE NORMANDY-NORTHERN FRANCE AND SIEGFRIED LINE CAMPAIGNS

A. NATURE OF THE SAMPLE

A representative list of 90 Allied infantry division attacks has been prepared in order to illustrate the character of advances achieved and the casualties incurred. Eighty-seven of the attacks were by U.S. units, and three were by Canadian divisions (included for comparative purposes). The 50 actions in Normandy-Northern France occurred between mid June and mid August 1944, with the exception of two attacks during the capture of Cherbourg in early September. The 40 U.S. actions during the Siegfried Line campaign occurred in the Fall of 1944. Five battles of the Ardennes campaign, coming in the final U.S. counterattack phase, are also included in this group, since the terrain was comparable to that of the Fall battles.

The place names are generally descriptive, in the sense that they designate the main town or terrain feature near the scene of battle. In some cases, it will be noted, several actions occurred over several days near the same place name. A few operations are designated by the code name--"Cobra" (the U.S. breakthrough in Normandy), "Goodwood-Atlantic," and "Totalize" (British-Canadian operations) in the same campaign.

It should be stressed that many attacks fail to gain any ground, and these 90 advances were chosen because they did show an advance. Later, the approximate percent of all attacks in which advances occurred is determined.

Only bald statistics are presented, since, for purposes of statistical analysis and simulation, descriptive text on each

battle really contributes little beyond some additional understanding of factors that cannot be quantified.

B. DATA SOURCES

The figures on strengths, casualties, and advances are drawn from primary historical records or official histories (the bibliography indicates the sources of the data). Only in the case of the three Canadian actions are the unit-strength figures estimated, in view of the nonavailability of Canadian source records.¹ Terrain descriptors and degree-of-resistance estimates are taken directly from official and unit histories or after-action reports. In the case of those actions that cover several days, the unit strength given is the average of the recorded strength on the several days. Since, generally, these strengths varied comparatively little, the averages are probably close to the actual figures.

C. THE NATURE OF THE TWO CAMPAIGNS

In order that the reader not familiar with the two campaigns might be better able to put into proper context the comments and statistics that follow, a brief description of each campaign seems in order.

1. Normandy-Northern France

The Normandy-Northern France campaign occupied the first 90 days after the Allied invasion of 6 June 1944. Once ashore and the bridgehead was secured, the Allies drove to expand it, moving very slowly and with severe losses. On the Allied left, the British and Canadians inched toward the open country and east of Caen. Here the Germans amassed most of their panzer strength to cover the good tank

¹Curiously, the "A" or G1 Sitrep of Main HQ, 21st Army Group, which is in U.S. Archives, gives daily strengths for U.S. divisions, but not for British or Canadian formations.

country. The Americans in the West fought a grim six weeks through the bocage or hedgerow country--ideal for defense. Advances were measured in yards, from one hedgerow to another. (Nineteen of the actions examined fall in the period 6 June-24 July.)

Despite the capture of Cherbourg by American forces on 27 June and of half of Caen by the British and Canadians on 8 July, the Allies seemed to have been stalemated. By the third week in July, the bridgehead remained a fraction of what it was supposed to have been by that date. Allied losses were severe--and not only in the infantry. A major British breakthrough effort on 18 July led to the loss in two days of 36 percent of all British tanks on the Continent.

Nevertheless, the attrition told more on the Germans, whose forces were being bled away without even being able to launch a major counterattack. The German command realized that if their front broke they would have no recourse but to retreat right back to the German frontier area, where natural defenses were more available.

The second half of the campaign (the campaign divides neatly into six-week halves) began with the American attack and breakthrough at St. Lo on 25 July. The American forces burst out of the bridgehead into Brittany, while Montgomery's British and Canadians attacked south from Caen. With Patton's swift success in Brittany, it was decided by 2 August to launch the bulk of his Third Army out across France toward Paris. At the same time, the largest attack the Germans were ever able to mount in the campaign, against Mortain on 7 August, was soon smothered, after only a slight initial advance.

The Americans driving up from the South and the British driving down from the North put the German Seventh Army into a sausage-shaped salient barely 15 miles wide at its base at Falaise-Argentan. Retreating out of the pocket, the German Seventh Army was smashed to pieces, yet the shoulders of the opening to the East were held open against the British long enough for the remnants of the German forces to escape.

Paris was liberated on 24 August, and Allied columns streamed across France almost to the Belgian border. In the meantime, the Allied landing in southern France launched the U.S. Seventh Army northward. (The other 31 Normandy-Northern France actions fall in this second six-week period.)

The battle in Normandy-Northern France was over by 3 September. The Germans had lost almost half a million men. The campaign was one of almost continuous Allied offensive operations against German defensive positions. These latter could be categorized as hastily fortified positions, or prepared positions, until the time of the breakthrough. In addition, siege operations were conducted against the several Brittany port strongholds.

2. The Siegfried Line

The grinding battles fought by the First and Ninth U.S. Armies between 11 September and 16 December were only part of the overall Allied operations of the period. However, all the advances achieved were small compared to the spectacular advances of August and early September, after the breakout from Normandy. While the British and Canadians painfully cleared the lower Netherlands, the two northern American armies tried to battle through the fortifications of the Westwall and the natural barriers of Germany's borders. The nature of the fighting on this front can best be realized by the fact that from 11 September, when U.S. patrols first crossed the German frontier, until 16 December (96 days later) U.S. forces managed to advance only 22 miles into Germany. There were no grand pursuits. U.S. forces had to fight for almost every yard of advance. There were no armored breakthroughs, and tanks were used in an infantry support role only. A heavy price in men and materiel had to be paid for every yard gained.

After the rush across France, the allies had approached the Siegfried Line in spread pursuit formation. They had reached the limit of their logistical capabilities, the troops were tired, and

there was a two-week lull in the pursuit. Once at the frontier, they met a revitalized German army, which used the artificial and natural barriers to great advantage. It became difficult to advance very far, until the logistical and tactical strength had been built up and the enemy worn down by attrition.

Attrition was the hallmark of the Siegfried Line campaign. Battle was on a regimental level at best. The isolation imposed by the terrain (the forest was much like, but even worse than, the hedgerows of Normandy) meant that control was very difficult and that small units carried the action forward individually rather than as part of a larger-scale scheme of maneuver. The real enemy, the American forces agreed, was the forest. It created not merely a combat meat-grinder but, combined with the weather, led to staggering noncombat losses as well.

Fighting desperately and effectively on ground ideally suited to the defense, the Germans fought very active defensive operations. During this period, American forces were on the defensive a large part of the time, fighting off incessant German counterattacks. Thus, the number of U.S. attack days was considerably smaller than for an equivalent period in Normandy-Northern France.

D. TERRAIN

Terrain has been categorized as (1) open, (2) mixed, and (3) close or difficult. The word mixed thus includes the two commonly used descriptors, moderately open and moderately close, the distinction between which is really rather fine and essentially judgmental.

1. Normandy

The Normandy terrain was of a diversified nature, but only within certain bounds. On the Allied left (the British-Canadian flank) was the Caen-Falaise plain, gently rolling open country of cultivated fields and pastures, dry and firm ground suitable for large-scale

armored operations and airfield construction. Facing the Allied center between the Orne and the Vire Rivers were the northern fringes of a sprawling mass of broken ground, small hills, low ridges, and narrow valleys, gradually rising in height toward the South. West of the Vire River, in the Carentan area, was a marshy depression crisscrossed by slow streams and drainage ditches. On the Allied far right, between the marsh land and the coast, a cluster of hills dominated the countryside. There were no mountains, and hills and ridges were gently sloped and rounded.

With the exception of the Caen-Falaise plain, the area had a compartmentalized character, which restricted maneuver and favored defense. These natural limitations were compounded by the hedgerows, with their often associated sunken lanes and dense vegetation. This bocage country was extremely difficult terrain, in which U.S. troops were compelled to operate until in late July they began pushing into more open country. While some of the British front included bocage country, the Canadian actions listed herein all took place in the more open Caen plain.

Some of these operations included river crossings, which have been included, along with bocage and swamps, as difficult country (category 3, above).

Similarly, the two U.S. actions against Brest are categorized as in difficult terrain (the first being in the approach to the city; the second, city street fighting--certainly a most difficult environment). It should also be noted that many of these 50 actions involved fighting in towns and villages, but it is usually unstated in the record just how much of an action actually took place within built-up areas. Consequently, no separate category has been established for this combat environment.

2. Westwall

In the Westwall campaign, September-December 1944, the First U.S. Army operated in two very different terrain regions. The left

wing of the Army faced the Aachen Gap, guarded by the city of Aachen itself, which afforded entry to the open plain that led all the way to the Rhine. The country here was farmland mixed with small woods. Opposite the right wing of the Army was the Eifel, an area of heavily forested highlands, which could seriously canalize an advance and in which communications were virtually nonexistent. Some of the hardest fighting of the campaign was to occur in a fan-shaped sector reaching out from Aachen toward the Roer River.

The heartland of the Eifel itself, compartmentalized by numerous streams and blanketed with dense, wet pine-forest, was where the first American patrols had crossed into Germany. Yet, for all the difficulties presented by the terrain, it had been used to military advantage by the Germans in 1914 and 1940. They would use it again in their Ardennes counteroffensive of December 1944.

Once through the forest, U.S. forces entered the open country of the Roer Plain, where armor once more was able to operate as more than infantry support.

In addition to the formidable natural barriers, the U.S. forces had to smash their way through the Westwall. This, the Siegfried Line, was built on the first natural barrier east of the German border. Its purpose was to increase the defensive potential of the terrain along the border. Where the natural barrier was weakest, the concentration of fortifications was strongest. The Line consisted of a large number of reinforced concrete pillboxes, sited to be mutually supporting and armed with automatic weapons and light antitank guns. These were well camouflaged by several years of natural growth and disuse. There were, in addition, open earthworks for heavier artillery and extensive hasty field fortifications for the infantry. The Line constituted a continuous barrier all along the front of the First U.S. Army.

In actual fighting, however, the fortifications probably caused U.S. forces less difficulty than did the forest itself.

The Fall of 1944 was to produce weather of near record severity. Rainfall far exceeded the average, while frost and snow were earlier and more frequent than usual. Not merely did the weather seriously hamper infantry and armored operations, especially in the attack, but it also degraded markedly the effectiveness of Allied air support of the ground forces.

Close terrain was primarily forest with deep narrow ravines and small streams. Mixed terrain was a combination of forest and farmland. Open terrain was essentially the plain area beyond the forest belt along the German border. Needless to add, characterization of terrain is generally gross. The breakdown of 40 Siegfried Line battles according to terrain type is shown thus:

close (forest)	- 14 battles -	35 percent
mixed	- 16 battles -	40 percent
open	- 10 battles -	25 percent

A major action at this time was the capture of Aachen, and many of the October battles covered were part of the movement to encircle the city. However, no actions within the city itself were included. Many of the other battles involved fighting in settled areas; and, as in the Normandy case, it is generally not possible to distinguish what proportion of an action occurred in a town versus the proportion that occurred on the open ground around it.

E. DEGREE OF RESISTANCE

In the absence of German strength figures comparable to those obtainable for U.S. units, degree of resistance rather than force ratio or enemy posture has been used as the descriptor for the enemy. The terms comprehend primarily three factors: the unknown force ratios, the nature of the enemy position, and the spirit of the enemy troops. The degree of enemy entrenchment--fortified position, prepared position, etc.--is not the best descriptor, since it is the fighting spirit of resistance maintained by the troops, as much as the strength of their position, that ultimately determines degree

of resistance. Clearly, of course, there is an interrelationship between the two, each factor reinforcing the other. However, the Second World War offers many examples of second-quality troops being forced out of very strong positions at small cost to the attacker.

In the Normandy cases, three simple categories of resistance are used: heavy, moderate, and light. For the Siegfried Line cases, five categories are used because the records employed a further breakdown of descriptor: heavy, moderate to heavy, moderate, light to moderate, and light. A more fine-grained and precise general categorization is really not supportable by the historical record, since the degree of resistance may well vary in different areas of a division attack front, as well as at different times during the period of the attack.

An important anomaly becomes obvious in this categorization. The descriptor terms are those generally used in reference to the actions in the official histories. Yet in several cases the term used does not appear to accord with the casualties suffered. For example, in Normandy the 9th Division at Briouze-Fromental Road took 137 casualties against what historians referred to as light opposition, while the 2nd Division at Brest suffered only 73 casualties against resistance designated as heavy. On 28 November, the 104th Division reported "heavy resistance," but casualties numbered only 79. On 21 November the 8th Division, against "heavy resistance," suffered only 38 casualties; and on 27 November, only 46 casualties. The spread between losses to claimed "heavy resistance" in the Siegfried Line actions runs from a low of 38 to a high of 972.

It is obvious that no standard measure exists for the relationship between degree of resistance and casualties--anymore than for advances (as mentioned above). Clearly, reaction to what was termed "heavy resistance" varied. A unit could stop after fairly light casualties, or it could continue to drive ahead and take even greater losses. Both would have encountered heavy resistance, but with

different consequences. Circumstances are so varied as to defy any neat distinctions.

What is suggested is that there may be no direct correlation between the number of casualties and the degree of resistance the troops felt they were encountering. The historical record is full of cases of attacks being stalled by very small opposing forces, because the attackers thought they were meeting heavy resistance rather than because that heavy resistance really existed.

F. DURATION OF COMBAT

Most of the actions represent single-day actions, although several battles are really composed of a number of single-day actions. For simplicity's sake, a single day has been established as the base unit, despite the fact that in nearly every case the action lasted less than a full day and, for most actions, even less than the daylight period of the day. The purpose of the study is not to determine rates of advance on an hourly basis, but rather to determine the scale of the forward movement achieved in a good-sized sample.

G. LEVEL OF RESOLUTION

While the actions listed all involved a single division, it should be understood that the entire division was not always involved. Attacks involving two of three regiments were most common, while single regiment attacks are also included, since they did represent an effort mounted by a division in which the division artillery and tank units invariably participated. There are also included cases where all three regiments or brigades attacked simultaneously, but divisional attacks using only a portion of the division were the norm. Battle really was a contest between regimental-sized units with their supporting elements.

H. ANALYSIS OF ADVANCE DATA--NORMANDY-NORTHERN FRANCE

In terms of terrain, 19 of the attacks were made over close terrain, 5 over open terrain, and 28 over mixed terrain. Of these 50 attacks, 22 were against opposition categorized as "heavy," 14 against "moderate," and 14 against "light." A simple time distinction can be made. Those battles before 31 July (Actions #1-26 in Table 1) were heavy going, generally, against well-defended positions. After the breakthrough of Operation Cobra, from 31 July on, German opposition generally began to diminish to the point where, by mid August, the situation began to assume the proportions of a pursuit.

Actions 49 and 50 (street fighting in Brest) really belong in the first category by virtue of the severity of the fighting involved, although they occurred during the pursuit phase elsewhere in France.

The advances ranged from a high of 10,600 yards to a minimum of 300 yards. The median number was 2400 yards. The advances on a daily basis can be grouped as shown in Table 2.

Daily advances in terms of degree of resistance encountered are shown in Table 3.

There is a marked variation in advance gained within each category, running, for heavy opposition, from 300 to 8000; for moderate, from 1000 to 9700; and for light, from 2000 to 6000. The highest individual gains were registered against heavy and moderate opposition.

The following averages can be derived from the data:

- Average daily advance for 22 successful attacks against generally heavy resistance (excluding 20 and 21, since they gained no ground; but including 49 and 50) is 1882 yards.
- Average daily advance for 14 attacks against generally moderate resistance is 3023 yards.
- Average daily advance for 13 attacks against generally light resistance is 3984 yards.
- Average daily advance for 50 attacks (excluding 20 and 21) is 2794 yards.

Table 1. INFANTRY DIVISION ATTACKS (NORMANDY-NORTHERN FRANCE)

Action Number	Unit	Location	1944 Date	Duration (Days)	Terrain Code	Degree of Resistance	Allied Strength	Battle Casualties	Actual or Daily Average of Advance
1.	2nd Inf.	Forest de Cerisy	13-14 Jun	2	Close	Heavy	14,340	473	1750 yds
2.	9th Inf.	Pont l'Abbe	14-15 Jun	2	Close	Moderate	13,110	242	1250 yds
3.	29th Inf.	Amy	16 Jun	1	Close	Moderate	13,600	171	3000 yds
4.	2nd Inf.	St. Germain d'Elle	16 Jun	1	Close	Heavy	13,858	558	300 yds
5.	79th Inf.	Montgardon Ridge	2-7 Jul	5	Close	Heavy	12,978	2070	2100 yds
6.	82nd Abn.	Poterie Ridge	3-5 Jul	3	Close	Heavy	6,591	624*	2450 yds
7.	90th Inf.	Monte Caestre	3-7 Jul	5	Close	Heavy	13,325	2000	1400 yds
8.	3rd Canadian Inf.	Caen	8-9 Jul	2	Open	Heavy	17,500**	1194	4100 yds
9.	30th Inf.	Vire River bridgehead	7 Jul	1	Close	Heavy	13,872	281	2500 yds
10.	83rd Inf.	Periers Sector	4-5 Jul	2	Close	Heavy	12,528	1855	900 yds
11.	83rd Inf.	Carentan-Periers Road	9 Jul	1	Close	Heavy	12,769	122	700 yds
12.	30th Inf.	Pont Herbert	10 Jul	4	Close	Heavy	13,185	202	3000 yds
13.	2nd Inf.	Hill 192	11 Jul	1	Close	Heavy	14,824	407	1350 yds
14.	29th Inf.	Martinville Ridge	11 Jul	1	Close	Heavy	14,400	444	2400 yds
15.	8th Inf.	Hill 92	12 Jul	1	Close	Light	13,130	344	2000 yds
16.	79th Inf.	Hill 92	12 Jul	1	Close	Light	11,641	115	2500 yds
17.	9th Inf.	Les Champs des Losques	13 Jul	1	Close	Moderate	14,411	228	1500 yds
18.	4th Inf.	Toward Periers	5-15 Jul	10	Close	Heavy	14,788	2300	350 yds
19.	2nd Canadian Inf.	"Goodwood-Atlantic"	18-21 Jul	4	Open	Heavy	17,500**	1149	1450 yds
20.	4th Inf.	"Cobra"	26 Jul	1	Mixed	Heavy	14,933	115	8000 yds
21.	5th Inf.	"Cobra"	26 Jul	1	Mixed	Moderate	14,215	188	2000 yds
22.	2nd Inf.	"Cobra"	26 Jul	1	Mixed	Heavy	14,468	477	3000 yds
23.	8th Inf.	"Cobra"	26 Jul	1	Mixed	Heavy	13,505	407	750 yds
24.	2nd Inf.	"Cobra"	27 Jul	1	Mixed	Moderate	14,393	463	1000 yds
25.	5th Inf.	"Cobra"	28 Jul	1	Mixed	Heavy	14,146	216	1000 yds
26.	2nd Inf.	"Cobra"	30 Jul	1	Mixed	Heavy	14,078	185	1300 yds
27.	2nd Inf.	"Cobra"	31 Jul	1	Open	Light	14,193	100	4200 yds
28.	2nd Inf.	Vire	1 Aug	1	Mixed	Moderate	14,059	255	4000 yds
29.	35th Inf.	Torigny-sur-Vire	1 Aug	1	Mixed	Light	13,157	130	5500 yds
30.	1st Inf.	Bresey	2 Aug	1	Mixed	Light	14,720	50	4000 yds
31.	2nd Inf.	Tessy-sur-Vire	2 Aug	1	Mixed	Light	13,969	112	6000 yds
32.	35th Inf.	Tessy-sur-Vire	2 Aug	1	Mixed	Light	12,945	214	6000 yds
33.	9th Inf.	Bresey	3 Aug	1	Mixed	Light	13,717	148	3000 yds
34.	2nd Inf.	Tessy-sur-Vire	3 Aug	1	Mixed	Moderate	14,295	94	3000 yds
35.	35th Inf.	Tessy-sur-Vire	3 Aug	1	Mixed	Light	12,690	174	3000 yds
36.	2nd Inf.	Vire	4 Aug	1	Mixed	Moderate	14,589	65	4400 yds
37.	2nd Inf.	Vire	5 Aug	1	Mixed	Light	14,341	202	2000 yds
38.	2nd Inf.	Tinchebray	9 Aug	1	Mixed	Light	14,621	18	3800 yds
39.	29th Inf.	Vire	6 Aug	2	Mixed	Moderate	12,850	407	2000 yds
40.	2nd Canadian Inf.	"Totalize"	7 Aug	1	Mixed	Moderate	17,000**	323	9700 yds
41.	28th Inf.	Mortain	11 Aug	1	Mixed	Moderate	12,320	274	1000 yds
42.	29th Inf.	Mortain	11 Aug	1	Mixed	Moderate	12,997	184	1000 yds
43.	29th Inf.	Tinchebray	13 Aug	1	Mixed	Moderate	13,311	77	3400 yds
44.	29th Inf.	La Freane Paret	14 Aug	1	Mixed	Moderate	13,454	44	4000 yds
45.	2nd Inf.	Tinchebray	14 Aug	1	Mixed	Heavy	13,574	309	1100 yds
46.	29th Inf.	Tinchebray	15 Aug	1	Mixed	Light	13,651	20	6000 yds
47.	2nd Inf.	Tinchebray	15 Aug	1	Mixed	Light	13,779	70	5000 yds
48.	9th Inf.	Briouze Frontal Road	17 Aug	1	Mixed	Light	13,362	137	3000 yds
49.	2nd Inf.	Brest	1 Sep	1	Close	Heavy	13,511	74	800 yds
50.	2nd Inf.	Brest	9 Sep	1	Close	Heavy	14,468	92	800 yds

*4-5 July only. **Estimated.

Table 2. DAILY ADVANCES IN 50 SUCCESSFUL ALLIED DIVISION ATTACKS

Yards per day	Number of Cases													Percentage
	0	1	2	3	4	5	6	7	8	9	10	11	12	
300-999	14
1000-1999	24
2000-2999	18
3000-3999	18
4000-4999	12
5000-5999	4
6000-6999	6
7000-11,000	4

Table 3. DAILY ADVANCES BY RESISTANCE CATEGORY
[In yards]

Heavy (22 actions)	Moderate (14 actions)	Light (14 actions)
1750*	1250*	2000
300	3000	2500
2100*	1500	4200
2450*	2000	5500
1400*	1000	4000
4100*	4000	6000
2500	3000	6000
900*	4400	3000
700	2000*	3000
3000	9700*	2000
1350	1000	3800
2400	1000	6000
350	3500	5000
1450*	4000	3000
8000		
3000		
750		
1000		
1300		
1100		
800 - Brest		
800 - Brest		
*Represents a multi-day advance average.		

The relationship of terrain type to degree of resistance is shown in Table 4, which lists the advances under those categories. The variations here are marked, and the spread is quite wide.

Table 4. NORMANDY DAILY ADVANCES
[In yards]

Terrain Type	Degree of Resistance		
	Heavy	Moderate	Light
Open	4100 1450		4200
Mixed	8000 3000 750 1000 1300 1100	2000 1000 4000 3000 4400 2000 9700 1000 1000 3500 4000	5500 4000 6000 6000 3000 3000 2000 3800 6000 5000 3000
Close	1750 300 2100 2450 1400 2500 900 700 3000 1350 2400 350 800 800	1250 3000 1500	2000 2500

I. PERCENT OF ATTACKS WITH ADVANCES--NORMANDY-NORTHERN FRANCE

In order to determine very roughly what proportion of the attacks made in Normandy-Northern France gained ground, a hasty count was made of U.S. division attacks between 7 June and the beginning of September. Since it is simpler to think in terms of "division days" for the attack unit rather than "battles" (a term which is very difficult to define for statistical purposes when considering an action that is part of a much greater whole), what is enumerated is the number of days in which U.S. infantry divisions launched attacks against some degree of real opposition. This is to distinguish attack days from days in which divisions either were in contact with the enemy but not attacking, or were out of contact entirely. Days spent in advancing in pursuit of a fleeing enemy capable of no (or only scattered, disorganized) resistance have not been included either.

While in some circumstances an advance of 200 yards can be important (e.g., in city fighting), I have arbitrarily considered that advances of under 300 yards represented no advance.

A hasty search indicates the following totals, which include the 47 U.S. actions listed in Table 1 (71 attack days):

Infantry division attack days showing advance	- 331
Infantry division attack days showing no advance	- 40

The figure of 371 days cannot be claimed as the exact total for all U.S. divisions involved. However, any margin of error should not be great. The data indicate that some 12 percent of division attack days failed to achieve a gain of 300 yards or more.

J. ANALYSIS OF ADVANCE DATA--SIEGFRIED LINE

Fourteen of the attacks were over close terrain, 16 over mixed terrain, and 10 over open terrain. The resistance encountered by these 40 attacks may be categorized according to the descriptive terms as used in the official histories or after-action reports:

Heavy resistance	- 17 cases
Moderate to heavy	- 4 cases
Moderate	- 3 cases
Light to moderate	- 4 cases
Light	- 12 cases

Advances ranged from a daily high of 6800 yards to a minimum of 250. The median number was 1200 yards per day. Table 5 indicates the actual gains achieved against the different categories of resistance, and Table 6 recapitulates the daily advances by the five categories.

As with the Normandy cases, the erratic nature of these advances is striking, since there are anomalies in all columns. In large part, this must be ascribed to the categorization terms as employed in the histories. As mentioned earlier, there was clearly no single standard by which units measured degree of opposition. What was moderate or even light resistance to one unit might be considered heavy to another. It was the impression as much as the reality of opposition which created the image.

Table 7 breaks down the actions on a basis of yards gained.

The following averages can be derived from the data of Table 7:

- Average daily advance for 17 attacks against heavy resistance is 919 yards.
- Average daily advance for 4 attacks against moderate-to-heavy resistance is 900 yards.
- Average daily advance for 4 attacks against moderate resistance is 1895 yards.
- Average daily advance for 3 attacks against light-to-moderate resistance is 3333 yards.
- Average daily advance for 12 attacks against light resistance is 3217 yards.
- Average daily advance for all 40 attacks is 1882 yards.

Certain anomalies are also obvious here. The average advance against light resistance is less than that against light-to-moderate. Similarly, the advance against moderate-to-heavy resistance is less than that against heavy. These differences could be the result both

Table 5. INFANTRY DIVISION ATTACKS (SIEGFRIED LINE)

Action Number	Infantry Division	Location	Date	Duration (days)	Terrain Code	Degree of Resistance	Division Strength	Battle Casualties	Actual or Daily Average of Advance
1.	30th	Geilenkirchen	13 Sep 44	1	Mixed	Light	13,952	44	5000 yds
2.	30th	Alsdorf	7 Oct	1	Mixed	Light	13,049	132	3500 yds
3.	1st	Wurselen	9 Oct	1	Mixed	Heavy	13,834	130	1000 yds
4.	1st	Verlantenheide	8 Oct	1	Mixed	Heavy	14,187	98	800 yds
5.	30th	Alsdorf	8 Oct	1	Mixed	Moderate-Heavy	12,922	124	1500 yds
6.	30th	Bardenburg	9 Oct	1	Mixed	Moderate	13,221	138	2000 yds
7.	28th	Schmidt	2 Nov	1	Close/forest	Moderate	12,661	230	1500 yds
8.	28th	Schmidt	3 Nov	1	Close/forest	Light-Moderate	13,833	252	5500 yds
9.	28th	Vossenach	10 Nov	1	Close/forest	Heavy	13,663	97	2500 yds
10.	104th	Verlantenheide	16 Nov	1	Mixed	Heavy	14,298	93	1400 yds
11.	1st	Schneidhutte	17 Nov	1	Close/forest	Moderate-Heavy	14,113	16	1000 yds
12.	30th	Wurselen	16 Nov	1	Open	Light	14,144	158	1800 yds
13.	4th	Grosshau	18 Nov	1	Close/forest	Heavy	14,365	336	1000 yds
14.	104th	Eschweiler	19 Nov	1	Mixed	Light-Moderate	13,981	197	2500 yds
15.	104th	Eschweiler	22 Nov	1	Mixed	Light-Moderate	13,998	72	2000 yds
16.	4th	Weisser Weh Creek	16-20 Nov	5	Close/forest	Heavy	14,101	1433	500 yds
17.	8th	Huertgen	21 Nov	1	Close/forest	Heavy	13,978	38	500 yds
18.	8th	Huertgen	16 Nov	1	Close/forest	Heavy	13,509	290	400 yds
19.	4th	Schevenhutte	22 Nov	1	Close/forest	Moderate-Heavy	13,759	267	500 yds
20.	4th	Schevenhutte	23 Nov	1	Close/forest	Heavy	13,884	322	600 yds
21.	4th	Wenau Forest	25 Nov	1	Close/forest	Heavy	13,594	183	800 yds
22.	104th	Inden	28 Nov	1	Close/forest	Heavy	14,153	79	2000 yds
23.	4th	Grosshau	27 Nov	1	Mixed	Heavy	13,859	213	800 yds
24.	1st	Schevenhutte	28 Nov	1	Close/forest	Light	13,937	107	1000 yds
25.	8th	Huertgen	27 Nov	1	Mixed	Heavy	13,597	46	800 yds
26.	1st	Huertgen	17 Nov	1	Close/forest	Moderate-Heavy	13,967	265	500 yds
27.	8th	Bergstein	3 Dec	1	Mixed	Moderate	12,830	136	1000 yds
28.	84th	Roer River	1-4 Dec	4	Open	Heavy	13,459	1001	625 yds
29.	102nd	Roer River	1-4 Dec	4	Open	Heavy	13,346	991	625 yds
30.	104th	Pier	10 Dec	1	Mixed	Heavy	13,356	115	2000 yds
31.	83rd	Gurzenich	13 Dec	1	Mixed	Moderate	13,017	337	3000 yds
32.	78th	Rollesbroich	13 Dec	1	Open	Light	13,668	63	2000 yds
33.	2nd	Arenberg	13 Dec	1	Open	Light	14,137	138	3000 yds
34.	99th	Arenberg	13 Dec	1	Open	Light	13,676	90	1200 yds
35.	83rd	Berzbuir	15 Dec	1	Mixed	Heavy	12,485	251	700 yds
36.	82nd	Meyerode	28 Jan 45	1	Mixed	Light	9,618	26	6000 yds
37.	9th	Rohren	30 Jan	1	Open	Light	14,144	43	5000 yds
38.	2nd	Wetzfeld	30 Jan	1	Open	Light	13,884	63	3000 yds
39.	1st	Honsfeld	30 Jan	1	Open	Light	13,863	73	4800 yds
40.	2nd	Schonseiffen	2 Feb	1	Open	Light	13,702	192	6800 yds

Table 6. DAILY ADVANCES BY RESISTANCE CATEGORY
[In yards]

Heavy	Moderate- Heavy	Moderate	Light- Moderate	Light
1000	1500	1500	5500	500
250	1000	1000	2500	1800
1400	600	3000	2000	1000
1000	500	2000		2000
500*				3000
500				1200
392				6000
600				5000
2000				3000
625				4800
625				6900
800				3500
800				
800				
800				
2000				
700				
*Represents a multi-day advance average.				

Table 7. DAILY ADVANCES IN 40 SUCCESSFUL U.S. DIVISION ATTACKS

Yards per day	Number of Cases														Percentage
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Under 1000	35
1000-1999	25
2000-2999	15
3000-3999	10
4000-4999	2.5
5000-5999	7.5
6000-6999	5

of the imprecision of the categorization and of the smallness of the samples for the two split categories. It will be recalled that for the analysis of attacks in Normandy-Northern France, degrees of resistance were aggregated into three simple categories of heavy, moderate, and light in order to avoid problems of this sort. As it is, only 7 of the 40 attacks are of the split-category type. And it is not clear that the attempt at further refinement really contributes much; it seems instead to obfuscate the analysis.

The relationship of degree of resistance and terrain is shown in Table 8. While there are marked variations, the spread is not as wide as in the similar table on the Normandy cases.

Table 8. SIEGFRIED-LINE DAILY ADVANCES

[In yards]

Terrain Type	Degree of Resistance				
	Heavy	Moderate - Heavy	Moderate	Light-Moderate	Light
Open	625 625				1800 2000 3000 1200 5000 3000 4800 6800
Mixed	1000 800 1400 800 800 2000 700	1500	2000 1000 3000	2500 2000	5000 3500 6000
Close	2500 1000 500 500 400 600 800 2000	1000 600 500	1500	5500	1000

K. PERCENT OF ATTACKS WITH ADVANCES--SIEGFRIED LINE

In order to make a gross determination of the ratio of successful-to-unsuccessful attacks, a rough count was made of division attack days for First Army divisions. As mentioned previously, there were fewer of these than for the comparable period in Normandy, which was the result of the terrain, the existence of the concrete fortifications of the Siegfried Line, the bad weather that Fall, and the repeated enemy counterattacks. The difference between success and failure is relative in the sort of terrain considered here, but generally an attack which was described as making only "slight" or "minor" gains was considered as no gain--and therefore unsuccessful.

Another problem lies in the definition of the term attack itself. Attacks were not all aimed at maximum advance. Often a very limited objective was chosen, especially in the forest combat. Also, division attacks in the forest were often carried out by only a small portion of the entire division.

The record shows that between 15 September and 15 December there were some 137 attack days. Of these, 17 are described in the sources as achieving either no gain or only minor gain:

Infantry division attack days showing advance	- 120
Infantry division attack days showing no advance	- 17

Again, the figure of 137 cannot be considered an exact total for all U.S. divisions involved.

L. SUMMARY

Comparison of the two campaigns on a daily-advance basis (as shown in Table 9) provides some interesting insights on the variations to be encountered in battle:

Table 9. DAILY ADVANCES

[In yards]

Campaign	Degree of Resistance					Overall Average
	Heavy	Moderate-Heavy	Moderate	Light-Moderate	Light	
Normandy	1882	--	3023	--	3984	2794
Siegfried Line	919	900	1895	3333	3217	1882

The disparity is probably due in good measure to the two-part nature of the Normandy-Northern France campaign. The first, in the bocage country, was much like the forest fighting in the Siegfried Line. However, after the breakout the action moved to more open terrain with opposition generally declining.

The proportions of the two sets of attacks meeting the different degrees of resistance are quite similar, as shown in Table 10:

Table 10. COMPARISON OF DEGREES OF RESISTANCE

Campaign	Degree of Resistance		
	Light	(L-M--Moderate--M-H)	Heavy
Normandy	26%(13)	28%(14)	44%(22)
Siegfried Line	30%(12)	28%(11)	42%(17)

The variations (in Tables 4 and 8) relating terrain type to degree of resistance are so marked that any average is highly questionable.

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